



Implementation of Infeasible Interior-Point Methods Based on a New Search Direction

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Abstract: In this paper, we present the implementation of infeasible interior-point methods (IIPMs) for linear and nonlinear optimization with the full-Newton step based on an algebraic equivalent transformation (AET). The algorithm was implemented in Matlab language, thus supporting the effectiveness of the method. Numerical tests demonstrate the behavior of the algorithms for different results of parameters.

Keywords: *infeasible interior-point methods; nonlinear systems; primal-dual methods; new search direction; nonlinear resonances.*

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1 Introduction

Linear optimization (LO) has numerous applications in different fields such as economics, logistics, engineering, nonlinear dynamics and systems (see, *e.g.*, [6], [7]). The classical method for solving LO problems is the simplex algorithm proposed by Dantzig [2] in 1947. The appearance of interior-point algorithms (IPAs) in LO is the result of a longer process. From the literature, we know that the first result is due to Frisch, who proposed the use of logarithmic barrier functions in LO [8]. Later on Fiacco and McCormick [5] developed the sequential unconstrained minimization technique (SUMT). Since then, the barrier functions have been extensively studied.

The result of Karmarkar obtained in 1984 [9] had a great impact on mathematical optimization from both theoretical and practical point of view. He derived projective scaling IPAs with better complexity than the ellipsoid algorithm and he claimed that his algorithm had better practical performance. Moreover, it turned out that the IPA

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